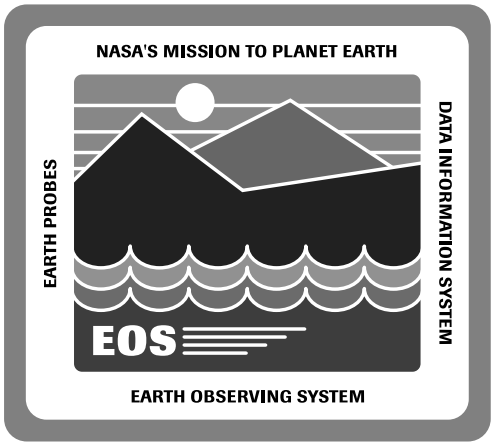


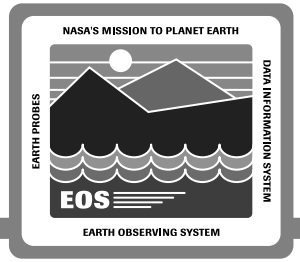
ECS Design Approach

Parag Ambardekar

pambarde@eos.hitc.com

ECS Release A SDPS/CSMS Critical Design Review
14 August 1995

Outline of ECS Design Approach



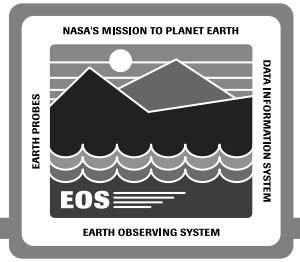
Technical Approach

Development Process

Status at CDR

Extending Release A Design to Release B

Terminology Used For ECS Components



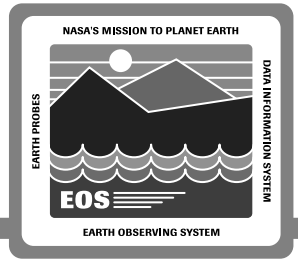
A Subsystem is a major ECS component, which provides one or more major functions and meets a group of related requirements

A Computer Software Configuration Item (CSCI) is a subsystem component

A Computer Software Component (CSC) is a CSCI component

An Object Class is a CSC component

High Level View of Methodology



Functional Decomposition down to system level; driven by requirements

Object Oriented software architecture at Subsystem Level

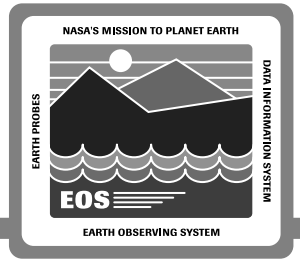
Encapsulation of software COTS elements

Transformation of models to detailed design influenced by COTS and Technology decisions

Software architecture independent of specific hardware configurations

Hardware and Network design driven by COTS, emerging technologies, sizing models, and carrier offerings

Object Modeling Technique and Tools

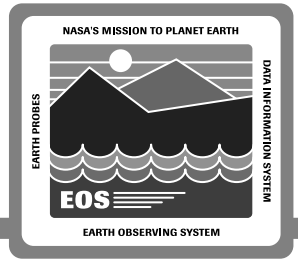


Rumbaugh's Object Modeling Technique

StP/OMT tool for design and development

A distinct object model for each CSCI

Inter-CSCI Interface Model



Classes labelled “private”capture functionality internal to a CSCI

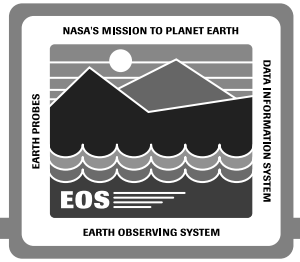
Classes labelled “public” capture interface details of a CSCI

Details of all public classes copied to a separate repository

Provides consistency checking and change control

Specified in Release A CSMS/SDPS Internal Interface Control Document (DID 313 - CD - 004 - 001)

External Interface Model



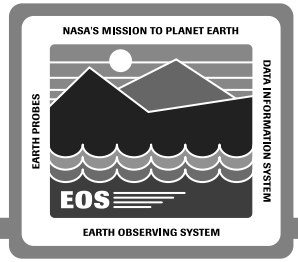
Similar to Inter-CSCI interface model

Each data flow mapped to a method in a public object class or COTS

Details of the method, expected data volume, and frequency described

Specified in Release A CSMS/SDPS Internal Interface Control Document (DID 313 - CD - 004 - 001)

Key Mechanisms



Several architectural functions are common to all applications

Development of a reusable design pattern is desirable

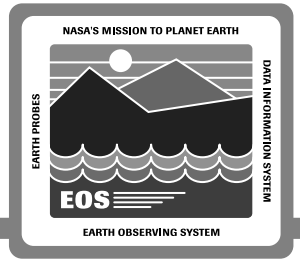
- **Promote software reuse**
- **Reduce complexity**

Key Mechanisms are reusable design patterns

- **Life-cycle services (Start-up, shutdown)**
- **Distributed Object Framework**
- **Error Detection and Reporting**
- **Universal Reference**

Documented in Release A CSMS/SDPS Internal Interface Control Document (DID 313 - CD - 004 - 001)

GUI Development



Solicit DAAC Inputs

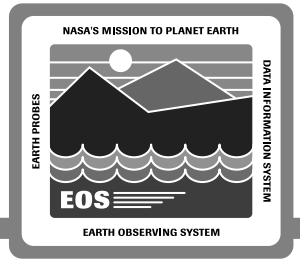
Develop methodology for HMI

Develop display standards, style guidelines, and design guidelines

Work Flow Analysis and Behavioral Analysis based on COTS selected

Involve DAAC personnel in finalizing screen Layout

Outline of ECS Design Approach



Technical Approach

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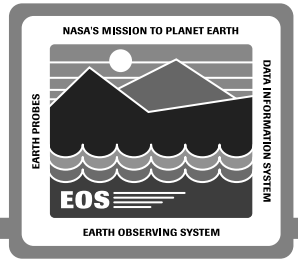
Requirements Engineering



Allocation of F&PRS L3 Requirements by Release (RbR)

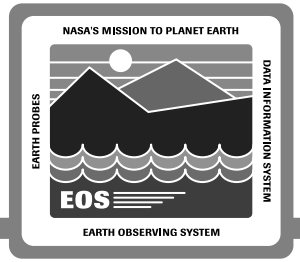
F&PRS L3 RbRs traced to L4 requirements

L4 requirements traced to design components (object class, CSC, etc.)

- **DID 305 Appendix A shows trace for formal track CSCIs**
- **Trace of L4s based on RTM baseline on July 15**

Use RTM for requirements engineering

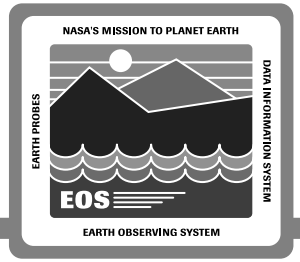
Development Process



Software Development Plan used in development process

- **Used in conjunction with the Project Instructions (inspections, peer review, etc.)**
- **Documents the process for formal and incremental track**
- **Ensures consistent application of methodology**
- **Provides guidance to the development team**
- **Updated to include lessons learned**

Multi-Track Software Development



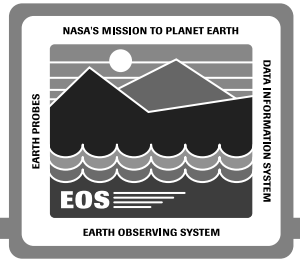
Formal Track Development

- **For those CSCIs where requirements are well understood**
- **CSCIs in Ingest, Data Server, Planning and Data Processing , and MSS subsystems**

Incremental Track Development

- **For those CSCIs whose requirements are not very firm or less understood**
- **Offers more flexibility for user feedback and implementation alternatives**
- **CSCIs in Release A Client, interoperability, Data Management, and CSS**

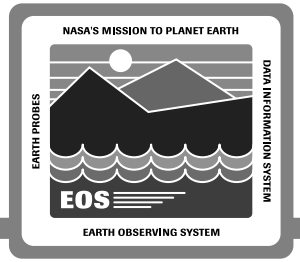
Inspections and Peer Reviews



Formal and informal peer reviews and inspections

- **ESDIS and Quality Office representatives present at inspections**
- **Minutes and Action Items recorded**
- **Progress in each development phase tracked by metrics**
- **Metrics data baselined, tracked, and reported by Quality Office**

Design Completeness Checklist



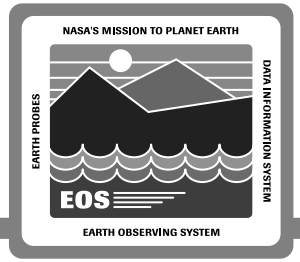
Design Completeness Checks included

- **Cover allocated requirements**
- **Identify all public classes**
- **Check consistency of interfaces**
- **Define all operations (methods), attributes, and associations**
- **Complete Data Dictionary**

StP/OMT used to

- **Perform many checks with automated scripts**
- **Major part of design documentation downloaded from StP/OMT**

Outline of ECS Design Approach



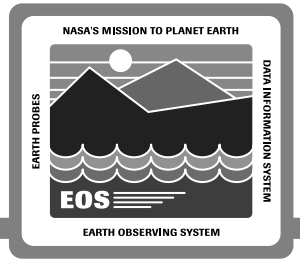
Technical Approach

Development Process

Status at CDR

Extending Release A Design to Release B

Release A CDR Statistics



Requirements Traceability

- **691 L3 RbRs allocated to Release A traced to 2270 L4 Requirements**

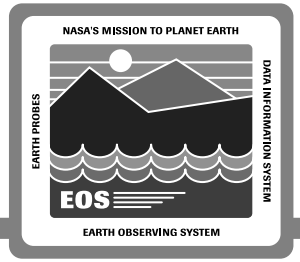
Metrics used, tracked, and reported monthly for CDR

- **698 Object classes designed**
- **120 Public (Interface) Classes designed**
- **30 Prototypes and Trade studies**
- **18 COTS selections made**

Release A COTS-Selections Completed

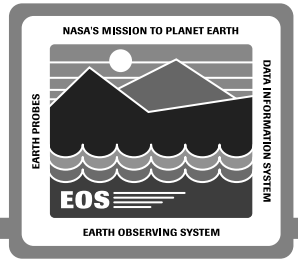
Product Category:	Product:	Status:
Security Management	HAL	Product In-house
Trouble Ticketing	Remedy	Product In-house
Physical Configuration Mgmt	Mountainview	To be purchased with Rel A buy
Change Request Manager	DDTS	Product In-house
Software Configuration Mgmt	ClearCase	Product In-house
Data Processing Scheduler	Autosys	Product In-house
DBMS	Sybase	Product In-house
FSMS	AMASS	Product In-house
Robotics	AML	Product In-house
Drives	NTP	To be purchased with Rel A buy
Memory Leak Detector	CaseVision	Product In-house
Code Checker	CaseVision	Product In-house
RAID Storage	Vendor Solutions	To be purchased with Rel A buy
LAN Analyzer	Network General Sniffer	To be purchased with Rel A buy

Release A COTS-Nearing Selections



Product Category:	Status:
Extensible Agent	Selection Pending ESDIS Concurrence
Baseline Configuration Mgmt	Selection Pending ESDIS Concurrence
FDDI switch	Selection Pending ESDIS Concurrence
Fault and Performance Mgmt	ECS Selection within the week

GUI Development Status



Solicit DAAC inputs

- **Ops workshop conducted in June 1995**

Develop HMI Methodology

- **Presentation at CDR**

Develop display standards, style guidelines, and design guidelines

- **ECS User Interface Style Guide on EDHS**

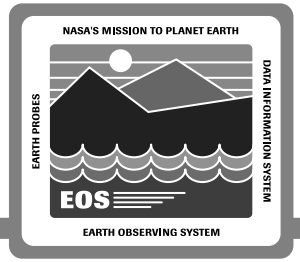
Work Flow Analysis and Behavioral Analysis based on COTS selected

- **Initial results at CDR**
- **Analyze multiplicity of GUIs**

DAAC involvement in finalizing screen Layout

- **Complete preliminary screen layout in October 1995**
- **DAAC review and interaction (4-6 weeks)**
- **Complete final screen Layout after DAAC review in November 1995**

Subsystem Differences



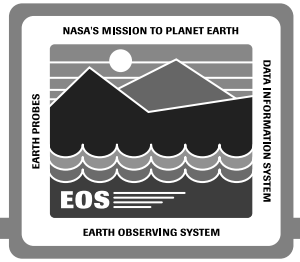
Subsystems

- **Apply design approach consistently**
- **Emphasize aspects unique to them**
- **Level of detail depends on the development track**

Examples

- **Internetworking Subsystem (ISS) is an integral part of hardware**
- **Data Management Subsystem (Incremental track, hardware insignificant)**
- **Data Server Subsystem (Formal Track, driven by hardware technology)**

Outline of ECS Design Approach



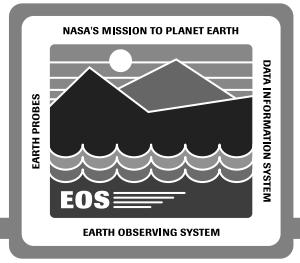
Technical Approach

Development Process

Status at CDR

Extending Release A Design to Release B

Extending Release A Design to Release B



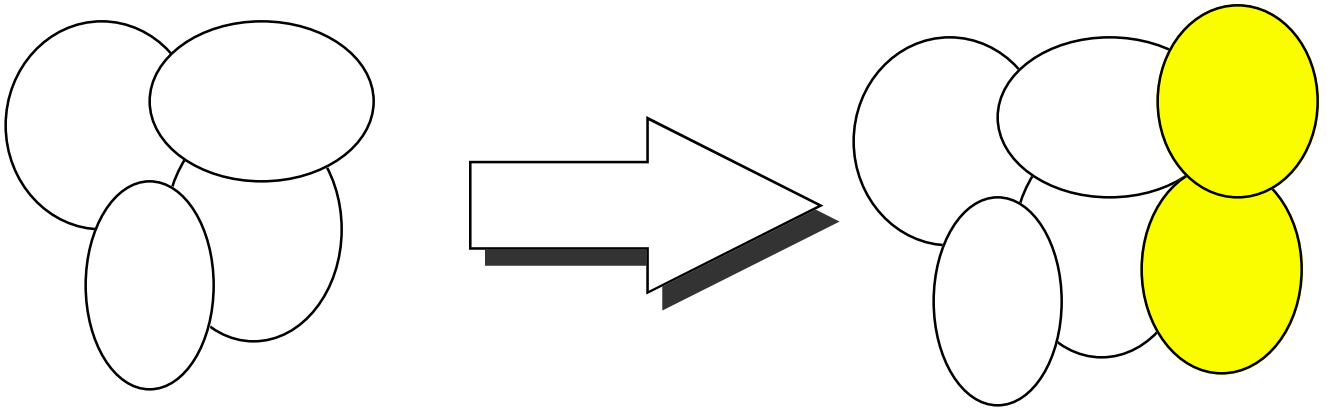
Release B follows the same design approach as Release A

Release B is a delta to Release A

- **Adds new functions to Release A**
- **Extends some functions of Release A**

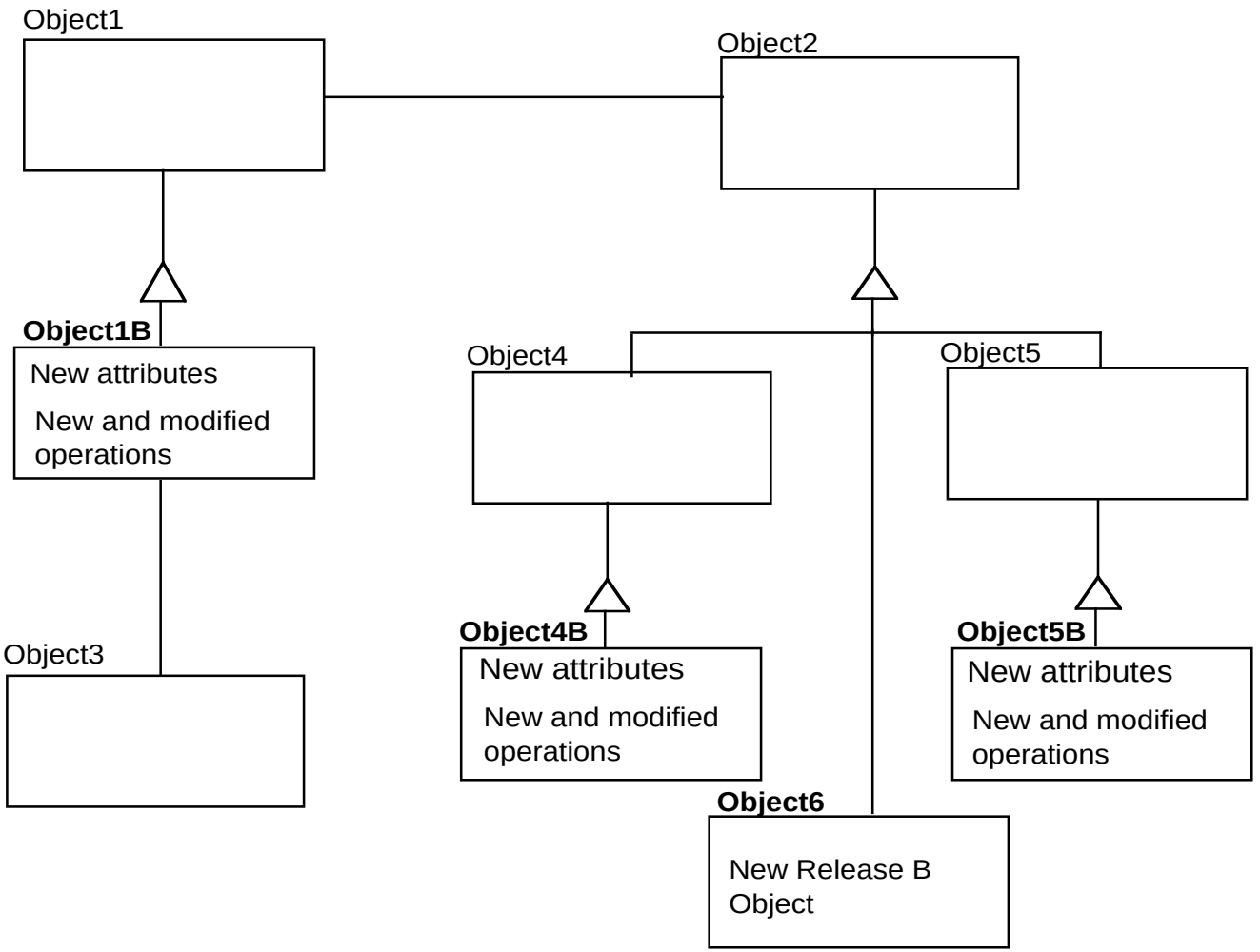
Methodology to Extend Release A Design

Where Release B extends functionality of Release A, the design goal is to add new objects rather than modifying existing objects



Release A Subsystem **Augmented Release B Subsystem**

Release B Design Methodology



Design Synchronization

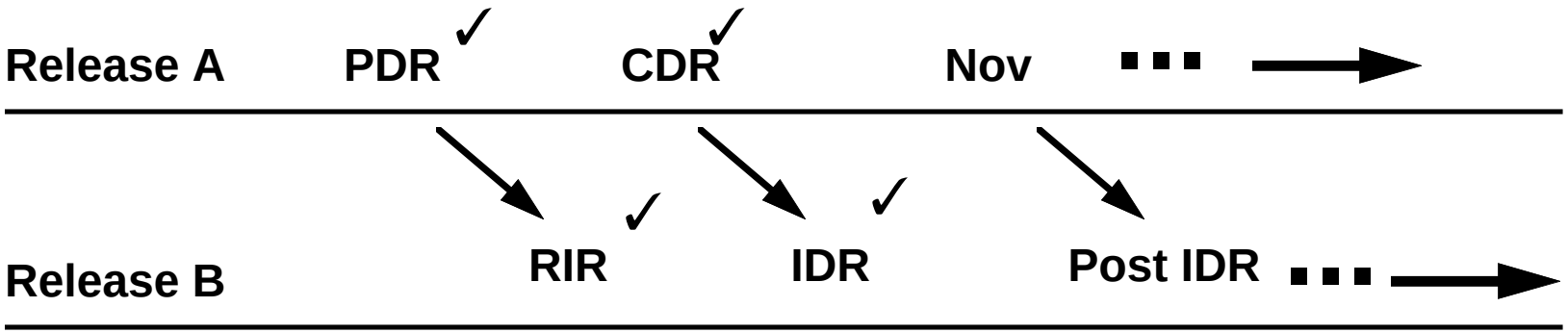
Release B design will be synchronized periodically

Release B design documents will reflect the baselined changes to the Release A design

Changes in StP/OMT controlled by automated scripts

- **design**
- **internal interfaces**

Changes to external interfaces controlled by CCB



Release B Synch Points